

180 Shakespeare Avenue

Flood Risk Assessment
August 2020



Quality Management

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Contents

Executive Summary	4
1. Introduction	5
1.1 Requirement	5
1.2 Report Objectives	5
1.3 Limitations	5
1.4 Sources of Information	5
2. Policy and Guidance	6
2.2 Flood and Water Management Act, 2010	6
2.3 National Planning Policy Framework (NPPF), July 2018	7
2.4 Planning Practice Guidance, November 2016	7
2.5 London Plan, December 2014	8
2.6 The London Plan, The Spatial Development Strategy for London, Consolidated with Alterations Since 2011, March 2015	8
2.7 Planning Practice Guidance Flood Risk and Coastal Change, April 2015	10
2.8 The SuDS Manual, CIRIA, 2015	11
3. Development Site Planning Considerations	12
3.1 Location	12
3.2 Proposed Development	12
3.3 Local Geology	12
3.4 Hydrogeology	13
3.5 Flood Zone	13
3.6 Vulnerability Classification	14
3.7 Sequential Test and Exception Test	15
3.8 Climate change	15
3.9 Existing Flood Risk Management Infrastructure	15
3.10 Historical Flooding	16
4. Sources of Flooding – Actual Flood Risk	17
4.2 Fluvial/Tidal Flood Risk	17
4.3 Flood Risk from Land, Surface Water and Sewers	17
4.4 Groundwater Flood Risk	18
4.5 Flood Risk from Artificial Sources	18
4.6 Residual Flood Risk	19
4.7 Summary of flood risk	19
5. Flood Risk Management	20
6. Conclusions & Recommendations	23

Appendices

Appendix A Existing Site and Proposed Plans
Appendix B Environment Agency Flood Map for Planning

Executive Summary

Site Name	180 Shakespeare Avenue Flood Risk Assessment
Location	180 Shakespeare Avenue, Hayes, Hillingdon, UB4 0BP
Grid Reference	510865, 181966
Area (ha)	Approximately 0.02ha
EA Flood Zone Classification	Flood Zone 2
Current Site Use	Residential
Description of proposed	Erection of the single-storey rear extension and front porch
Vulnerability Classification	Residential accommodation – ‘more vulnerable’
History of Flooding	No historical flooding incident records were found for the site
Summary of Pre-development Risks	• Fluvial/Tidal Flood Risk: Medium Risk • Flood Risk from Land, Surface Water and Sewers: Low Risk • Groundwater Flood Risk: Low Risk • Flood Risk from Artificial Sources: Low Risk • Residual Flood Risk: Low Risk
Management of Risks	• Finished floor levels within the proposed rear extension and front porch will be set no lower than existing levels and the concrete floor will be solid. The extension will not be used as sleeping accommodation. • It is recommended that internal stair access to and from ground floor, are to be maintained for the lifetime of the development, to provide access and egress routes in the event of a breach; • Non-return valves will be used in the drainage system to prevent back-flow of diluted sewage in situations where there is an identified risk of the foul sewer surcharging. • Wiring for telephone, TV, Internet and other services will be protected by suitable insulation to minimise damage. • Wall sockets will be raised to as high as is feasible and practicable to avoid damage if flood waters inundate the property.

1. Introduction

1.1 Requirement

- 1.1.1 Liska Environmental has been commissioned by DOTS Architectural Services Limited to undertake a desk based Flood Risk Assessment (FRA) for a development at 180 Shakespeare Avenue, Hayes, Hillingdon, UB4 0BP (Figure 3-1). It is understood by Liska Environmental that this report is to support a planning application for the erection of the single-storey rear extension and front porch.

1.2 Report Objectives

- 1.2.1 The contents of this FRA describe the assessment of the proposal and the implications of the proposed development on flood risk. The FRA has been prepared following guidance provided in the revised National Planning Policy Framework (July 2018) and the Planning Policy Guidance (November 2016).
- 1.2.2 The aim of this assessment is to provide the level of detail necessary to demonstrate that the potential effects of flood risk (to the proposal) have been addressed by:
- Identifying the source and probability of flooding to the application site, including the possible effects of climate change;
 - Determining the consequences of flooding to and from the proposed development proposal and advising on the how this will be managed, if necessary; and
 - Demonstrating the flood risk issues described in this assessment are compliant with the relevant guidance.

1.3 Limitations

- 1.3.1 The contents of this FRA describe the assessment of the proposal and the implications of the proposed development on flood risk. The FRA has been prepared following guidance provided in the revised National Planning Policy Framework (July 2018) and the Planning Policy Guidance (November 2016).
- 1.3.2 This report relies on publicly available information which Liska Environmental assumes to be correct: Liska Environmental cannot and does not verify accuracy of this data, and it is outside the scope of this commission to do so.

1.4 Sources of Information

- 1.4.1 Sources of information used during the compilation of this report include:
- Environment Agency (EA) website – ‘*Flood Map for Planning*’ [Accessed 28/08/2020];
 - British Geological Survey (BGS) website – ‘*GeoIndex*’ and ‘*Lexicon of Named Rock Units*’ [Accessed 28/08/2020];
 - Department of Environment, Food, and Rural Affairs (DEFRA) website – ‘*MAGIC Map Application*’ [Accessed 28/08/2020];
 - Environment Agency (EA) website – ‘*Catchment Data Explorer*’ [Accessed 28/08/2020].

2. Policy and Guidance

2.1 Thames Catchment Flood Management Plan (CFMP), 2009

- 2.1.1 A Catchment Flood Management Plan (CFMP) is a high-level strategic plan prepared by the EA, which identifies long-term (50 to 100 year) policies for sustainable flood risk within a catchment.
- 2.1.2 The relevant key messages contained within the Thames Region CFMP (2009) are that:
- Climate change will be the major cause of increased flood risk in the future; in urban areas and areas of narrow floodplain, flooding from heavy rainfall will be more regular and more severe. Surface water, sewer and fluvial flooding can occur within minutes of a severe rainfall event. Flooding can therefore occur at any time of the year, and there is very little time to provide flood warnings.
 - Development and urban regeneration provide a crucial opportunity to manage flood risk; the location, layout and design of development can all reduce flood risk. For example, the use of SuDS can help to control surface water runoff.
 - NPPF should be applied to ensure that flood risk is managed appropriately.

2.2 Flood and Water Management Act, 2010

- 2.2.1 Combined with the Flood Risk Regulations 2009 ('the Regulations'), (which enact the EU Floods Directive in the England and Wales) the Flood and Water Management Act 2010 ('the Act') places significantly greater responsibility on Local Authorities to manage and lead on local flooding issues. The Act and the Regulations together raise the requirements and targets Local Authorities need to meet, including:
- Playing an active role leading Flood Risk Management;
 - Development of Local Flood Risk Management Strategies (LFRMS);
 - Implementing requirements of Flood and Water Management legislation;
 - Development and implementation of drainage and flooding management strategies; and
 - Responsibility for first approval, then adopting, management and maintenance of Sustainable Drainage Systems (SuDS) where they service more than one property.
- 2.2.2 The Act also clarifies three key areas that influence development:
1. **Sustainable Drainage Systems (SuDS)** - the Act makes provision for a national standard to be prepared on SuDS, and developers will be required to obtain local authority approval for in accordance with the standards, likely with conditions. Supporting this, the Act requires local authorities to adopt and maintain SuDS, removing any ongoing responsibility for developers to maintain SuDS if they are designed and constructed robustly.
 2. **Flood risk management structures** - the Act enables the EA and local authorities to designate structures such as flood defences or embankments owned by third parties for protection if they affect flooding or coastal erosion. A developer or landowner will not be able to alter, remove or replace a designated structure or feature without first obtaining consent from the relevant authority.
 3. **Permitted flooding of third party land** - The EA and local authorities have the power to carry out work, which may cause flooding to third party land where the works are deemed to be in the interest of nature conservation, the preservation of cultural heritage or people's enjoyment of the environment or of cultural heritage.

2.3 National Planning Policy Framework (NPPF), July 2018

- 2.3.1 In determining an approach for the assessment of flood risk for the proposal there is a need to review the policy context. The National Planning Policy Framework requires that consideration be given to flood risk in the planning process. The National Planning Policy Framework was revised and issued in July 2018 and outlines the national policy position on development and flood risk assessment.
- 2.3.2 The Framework states that the appropriate development in areas at risk of flooding should be avoided by directing development away from areas at highest risk. Where development is necessary in flood risk areas, it can be permitted provided it is made safe without increasing flood risk elsewhere.
- 2.3.3 The essence of NPPF is that:
- Local Plans should be supported by Strategic Flood Risk Assessment and develop policies to manage flood risk from all sources, taking advice from the Environment Agency and other relevant flood risk management bodies, such as lead local flood authorities and internal drainage boards;
 - Policies in development plans should outline the consideration, which will be given to flooding issues, recognising the uncertainties that are inherent in the prediction of flooding and that flood risk is expected to increase as a result of climate change;
 - Planning authorities should apply the precautionary principle to the issue of flood risk, using a risk-based search sequence to avoid such risk where possible and managing it elsewhere;
 - The vulnerability of a proposed land use should be considered when assessing flood risk;
 - Opportunities offered by new developments should be used to reduce the causes and impacts of flooding;
 - Planning authorities should recognise the importance of functional floodplains, where water flows or is held at times of flood, and avoid inappropriate development on undeveloped and undefended floodplains; and
 - Development is based on the concept of Flood Risk Reduction, particularly in circumstances where development has been sanctioned on the basis of the “Exception Test”.

2.4 Planning Practice Guidance, November 2016

- 2.4.1 The National Planning Policy Framework sets strict tests to protect people and property from flooding which all local planning authorities are expected to follow. Where these tests are not met, national policy is clear that new development should not be allowed. The main steps to be followed are designed to ensure that if there are better sites in terms of flood risk, or a proposed development cannot be made safe, it should not be permitted.
- 2.4.2 The Planning Practice Guidance (PPG) document provides guidance on how the local planning authorities should:
- Assess flood risk;
 - Avoid flood risk; and

- Manage and Mitigate flood risk and coastal change.

2.4.3 There is also information on the requirements to consult the Environment Agency, on the role of lead local flood authorities and on flood risk in relation to minor developments.

2.5 London Plan, December 2014

2.5.1 Policy 5.12 of the London Plan (December 2014) outlines the need for a flood risk management, at strategic levels, planning decisions and LDF preparation. At a strategic level, the current and future flood issues will be minimised in a sustainable and cost effective way.

2.5.2 Development proposals must comply with the flood risk assessment and management requirements as set out in the NPPF and the associated technical guidance on flood risk over the lifetime of the development and have regard to measures proposed in Thames Estuary 2100 and Catchment Flood Management Plans.

2.5.3 Developments that are required to pass Exception Test set out in the NPPF and the Technical Guidance will need to address food resilient design and emergency planning by demonstrating that:

- The development will remain safe and operational under flood conditions
- A strategy of either safe evacuation and/or safely remaining in the building is followed under flood conditions
- Buildings are designed for quick recovery following a flood

2.5.4 Developments adjacent to flood defences will be required to protect the integrity of existing flood defences and wherever possible should aim to be set back from the banks of watercourses and those defences to allow their management, maintenance and upgrading to be undertaken in a sustainable and cost effective way.

2.6 The London Plan, The Spatial Development Strategy for London, Consolidated with Alterations Since 2011, March 2015

2.6.1 The London Plan is the overall strategic plan for London, setting out an integrated economic, environmental, transport and social framework for the development of London.

2.6.2 On 10 March 2015 the Mayor published the Further Alterations to the London Plan (FALP). FALP also incorporates the Revised Early Minor Alterations to the London Plan (REMA), which were published in October 2013. From this date the FALP are operative as formal alterations to the London Plan and form part of the development plan for London.

2.6.3 London Plan policies 5.3, 5.10, 5.12, and 5.13 apply to surface water management and flood risk mitigation. Applicable provisions within these policies are reproduced below.

Policy 5.3 Sustainable Construction

Planning decisions

Major development proposals should meet the minimum standards outlined in the Mayor's supplementary planning guidance and this should be clearly demonstrated within a design and access statement. The standards include measures to achieve other policies in this Plan and the following sustainable design principles:

- c. efficient use of natural resources (including water), including making the most of natural systems both within and around buildings*
- f avoiding impacts from natural hazards (including flooding)*
- i. promoting and protecting biodiversity and green infrastructure.*

Policy 5.10 Urban Greening

Planning decisions

Development proposals should integrate green infrastructure from the beginning of the design process to contribute to urban greening, including the public realm. Elements that can contribute to this include tree planting, green roofs and walls, and soft landscaping. Major development proposals within the Central Activities Zone should demonstrate how green infrastructure has been incorporated.

Policy 5.12 Flood Risk Management

Planning decisions

B. Development proposals must comply with the flood risk assessment and management requirements set out in the NPPF and the associated technical Guidance on flood risk¹ over the lifetime of the development and have regard to measures proposed in Thames Estuary 2100 (TE2100 –) and Catchment Flood Management Plans.

C. Developments which are required to pass the Exceptions Test set out in the NPPF and the Technical Guidance will need to address flood resilient design and emergency planning by demonstrating that:

- a) the development will remain safe and operational under flood conditions*
- b) a strategy of either safe evacuation and/or safely remaining in the building is followed under flood conditions*
- c) key services including electricity, water etc will continue to be provided under flood conditions*
- d) buildings are designed for quick recovery following a flood.*

Development adjacent to flood defences will be required to protect the integrity of existing flood defences and wherever possible should aim to be set back from the banks of watercourses and those defences to allow their management, maintenance and upgrading to be undertaken in a sustainable and cost effective way.

Policy 5.13 Sustainable Drainage

Planning decisions

¹ Technical Guidance to the National Planning Policy Framework, Department for Communities and Local Government, March 2012 or any subsequent guidance on flood risk issued in support of the NPPF

Development should utilise sustainable urban drainage systems (SUDS) unless there are practical reasons for not doing so, and should aim to achieve greenfield run-off rates and ensure that surface water run-off is managed as close to its source as possible in line with the following drainage hierarchy:

- 1 store rainwater for later use*
- 2 use infiltration techniques, such as porous surfaces in non-clay areas*
- 3 attenuate rainwater in ponds or open water features for gradual release*
- 4 attenuate rainwater by storing in tanks or sealed water features for gradual release*
- 5 discharge rainwater direct to a watercourse*
- 6 discharge rainwater to a surface water sewer/drain*
- 7 discharge rainwater to the combined sewer.*

Drainage should be designed and implemented in ways that deliver other policy objectives of this Plan, including water use efficiency and quality, biodiversity, amenity and recreation.

2.7 Planning Practice Guidance Flood Risk and Coastal Change, April 2015

- 2.7.1 The accompanying practice guidance to the NPPF provides additional guidance to local planning authorities to ensure the effective implementation of the planning policy set out in the National Planning Policy Framework on development in areas at risk of flooding.
- 2.7.2 The practice guidance provides supporting information on:
 - The application of the sequential approach and Sequential and Exception Tests;
 - Measures to reduce flood risk to acceptable levels;
 - How to manage residual risks; and
 - Guidance on how to take climate change into account.
- 2.7.3 The April 2015 update to the practice guidance provides additional guidance on SuDS, including:
 - The importance of SuDS;
 - When SuDS should be considered;
 - The SuDS discharge hierarchy;
 - Factors a local authority will address when considering SuDS as part of a planning application;
 - When SuDS are inappropriate and relevant flood risk consultees;
 - Applicability of Defra's Non-statutory Technical Standards for Sustainable Drainage Systems;
 - Design and construction cost considerations;
 - Operation and maintenance considerations; and
 - Where to go for further SuDS advice.
- 2.7.4 As part of the April 2015 update, the practice guidance provides details on the parties responsible for assessing the suitability of SuDS practices. As per paragraph 084 from the practice guidance:

The decision on whether a sustainable drainage system would be inappropriate in relation to a particular development proposal is a matter of judgement for the local planning authority. In making this judgement the local planning authority will seek advice from the relevant flood risk management bodies, principally the lead local flood authority, including on what sort of sustainable drainage system they would consider to be reasonably practicable.

2.8 The SuDS Manual, CIRIA, 2015

- 2.8.1 This guidance provides best practice on planning, design, construction, operation and maintenance of Sustainable Drainage Systems (SuDS) to facilitate their effective implementation within developments.
- 2.8.2 It looks at how to maximise amenity and biodiversity benefits, and deliver the key objectives of managing flood risk and water quality. There is also supporting information covering topics such as materials, landscape design, maintenance, community engagement, and costs and benefits.
- 2.8.3 The information presented in the publications is a compendium of good practice, based on existing guidance and research both in the UK and internationally, and the practical experience of the authors, project steering group, and industry.
- 2.8.4 The guidance provides the framework for designing SuDS with confidence and to maximise benefits. Its contents are relevant for a wide-range of professions, and roles, and it highlights that through engagement and collaboration SuDS can be integrated into the design of urban areas, to create high quality places for future generations.
- 2.8.5 The SuDS Manual has been used to provide the necessary design guidance for the surface water drainage strategy.

3. Development Site Planning Considerations

3.1 Location

- 3.1.1 The site, of approximately 0.02ha, is located at 180 Shakespeare Avenue, Hayes, Hillingdon, UB4 0BP at Ordinance Survey (OS) coordinates 510865, 181966.



Figure 3-1 Site Boundary. Source: Google Map

3.2 Proposed Development

- 3.2.1 The proposal consists of the erection of the single-storey rear extension and front porch. Further details about the proposals have been provided in Appendix A.

3.3 Local Geology

- 3.3.1 A review of the published geological information was carried out, including information from the BGS GeoIndex and Lexicon of Named Rock Units websites². The geological sequence underlying the Site is summarised in Table 3-1.

² <http://mapapps.bgs.ac.uk/geologyofbritain/home.html>

Table 3-1 Underlying Geological Sequence

Stratum	Name	Location	Parent Unit	Description
Bedrock Geology	London Clay Formation - Clay and Silt	Onsite	Thames Group	Sedimentary Bedrock formed approximately 48 to 56 million years ago in the Palaeogene Period. Local environment previously dominated by deep seas.
Superficial Deposits	None recorded	N/A	N/A	N/A

- 3.3.2 The BGS geological mapping shows that the Site bedrock comprises London Clay Formation - Clay and Silt. These sedimentary rocks are marine in origin. They are detrital and comprise coarse- to fine-grained slurries of debris from the continental shelf flowing into a deep-sea environment, forming distinctively graded beds.

3.4 Hydrogeology

- 3.4.1 The bedrock London Clay Formation is designated as is designated as Unproductive. These are geological strata with low permeability that have negligible significance for water supply or river base flow Aquifers previously designated as major and minor have now become principal and secondary respectively.
- 3.4.2 The nearest surface water feature is Yeading Brook which is located at approximately 50 m to the east of the site.

3.5 Flood Zone

- 3.5.1 Flood Zones describe the extent of flooding that would occur on the assumption that no flood defences are in place. The definition of Flood Zones is provided in Table 1 of the PPG and in table 3.1 below:

Table 3-1: Flood zone terminology

Flood Zone	Definition
Zone 1 Low Probability	Land having a less than 1 in 1,000 annual probability of river or sea flooding. (Shown as 'clear' on the Flood Map – all land outside Zones 2 and 3)
Zone 2 Medium Probability	Land having between a 1 in 100 and 1 in 1,000 annual probability of river flooding; or Land having between a 1 in 200 and 1 in 1,000 annual probability of sea flooding. (Land shown in light blue on the Flood Map)
Zone 3a High Probability	Land having a 1 in 100 or greater annual probability of river flooding; or Land having a 1 in 200 or greater annual probability of sea flooding. (Land shown in dark blue on the Flood Map)

Flood Zone	Definition
Zone 3b The Functional Floodplain	This zone comprises land where water has to flow or be stored in times of flood. Local planning authorities should identify in their Strategic Flood Risk Assessments areas of functional floodplain and its boundaries accordingly, in agreement with the Environment Agency. (Not separately distinguished from Zone 3a on the Flood Map)

- 3.5.2 The site lies within the Environment Agency's Flood Zone 2, which is described within PPG Table 1 as having a 'Medium Probability' of flooding. The Environment Agency's flood zone map is shown in Appendix B.

3.6 Vulnerability Classification

- 3.6.1 The proposed development is considered to fall under the classification of 'More Vulnerable' land uses based on Table 2 of PPG Technical Guidance. Table 3: Flood Risk Vulnerability and Flood Zone Compatibility in PPG, states that these land uses are compatible in Flood Zone 2 (as in Table 3.2 below).

Table 3.2: Flood Zone Risk and Vulnerability

Flood Zones	Flood Risk Vulnerability				
	Essential infrastructure	Highly vulnerable	More vulnerable	Less vulnerable	Water compatible
Zone 1	✓	✓	✓	✓	✓
Zone 2	✓	Exception Test required	✓	✓	✓
Zone 3a	Exception Test required	X	Exception Test required	✓	✓
Zone 3b	Exception Test required	X	X	X	✓

Key: ✓Development is appropriate XDevelopment should not be permitted

3.7 Sequential Test and Exception Test

- 3.7.1 Paragraph 101 of the NPPF sets out guidance on the application of the Sequential Test, the aim of which is to steer new development to areas with the lowest probability of flooding. Development should not be allocated or permitted if there are reasonably available sites appropriate for the proposed development in areas with a lower probability of flooding. Where areas of lower risk are not available, the Exception Test, as set out in paragraph 102 of the NPPF can be applied, to ensure that flood risk to people and property will be managed satisfactorily.
- 3.7.2 As the proposed development is classified as a 'Minor Development' - householder development, and there would be no additional vulnerability to flood risk nor any worsening of flood risk elsewhere over that as a result of the proposal on this site. Therefore, a Sequential and Exception Test are not required.

3.8 Climate change

- 3.8.1 The 'Flood risk assessments: climate change allowances' (2016) guidance outlines the allowances that are to be made for climate change when undertaking any form of flood risk assessment. This ensures that vulnerability of the development is minimised and that is resilient to flooding and coastal change in the future. These climate change allowances outlined in Table 2 of the above guidance are predictions of anticipated change for peak river flow, peak rainfall intensity, sea level rise and offshore wind speed and extreme wave height. Table 3.3 provides a precautionary response to the uncertainty about climate change impacts on rainfall intensities and river flows for the Thames River Basin District.

Table 3.3: Climate change risk

Parameter	Allowance Category	2015 to 2039	2040 to 2069	2070 to 2115
Peak River Flow	Upper End	25%	35%	70%
	Higher Central	15%	25%	35%
	Central	10%	15%	25%
Peak Rainfall Intensity	Upper End	10%	20%	40%
	Central	5%	10%	20%

- 3.8.2 The choice of the allowance category to be applied to the development is dependent on the type of development and the flood zone in which it lies. As the proposed development is classified as "More Vulnerable" and is located in flood zone 2, a 'Upper End allowance (i.e. +40% of peak rainfall intensity) will be taken into account, assuming there is a direct correlation between peak rainfall intensity and flood depth.

3.9 Existing Flood Risk Management Infrastructure

- 3.9.1 According to the Environment Agency's flood zone map the site is in Flood Zone 2 and there are no formal flood defences near the site.

3.10 Historical Flooding

- 3.10.1 According to the West London Strategic Flood Risk Assessment - Mapping, there are no historical flooding event recorded no site or adjacent to the site.

4. Sources of Flooding – Actual Flood Risk

4.1.1 The NPPF describes potential sources of flooding. It is necessary to consider the risk of flooding from all sources within a FRA. This section provides a review of flooding from land, sewers, groundwater and artificial sources, in addition to that from rivers and the sea.

4.2 Fluvial/Tidal Flood Risk

4.2.1 The Environment Agency's Flood map for Planning, was used to identify risk of flooding at site (refer Appendix B). These confirm that the site is in Flood Zone 2.

4.3 Flood Risk from Land, Surface Water and Sewers

4.3.1 Flooding from land can be caused by rainfall being unable to infiltrate into the natural ground or entering the drainage systems due to blockage, or flows being above design capacity. This can then result in (temporary) localised ponding and flooding. The natural topography and location of buildings/structures can influence the direction and depth of water flowing off impermeable and permeable surfaces.

4.3.2 Surface water flooding can be difficult to predict, much more so than river or sea flooding as it is hard to forecast exactly where or how much rain will fall in any storm. The Environment Agency classifies the site, as being within an area at low risk of surface water flooding. (i.e. each year this area has a chance of flooding of between 0.1% and 1%)

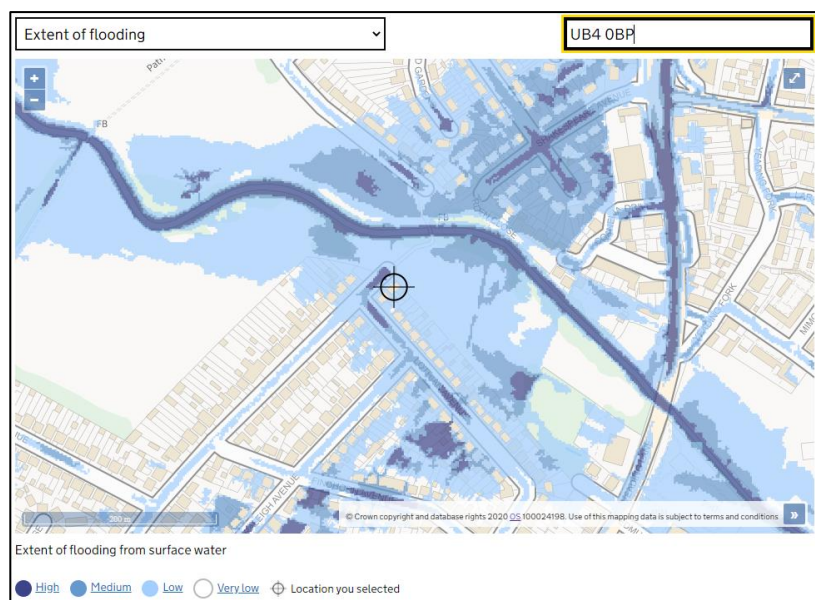


Figure 4-1: Surface Water Flood Map (Source Environment Agency³)

³ <http://watermaps.environment-agency.gov.uk/wiyby/wiyby.aspx?&topic=ufmfs#x=357683&y=355134&scale=2>
[accessed 28/08/2020]

4.4 Groundwater Flood Risk

- 4.4.1 According to the West London Strategic Flood Risk Assessment, the site is not located in the area with the potential for Elevated Groundwater, as the proposed development is on ground level, the risk of flooding from this source could be considered low.

4.5 Flood Risk from Artificial Sources

- 4.5.1 Artificial sources of flooding include reservoirs, canals, ponds and mining abstraction.
- 4.5.2 A review of the Environment Agency Reservoir Maps indicates that the site is within an area at risk from reservoir flooding. Reservoir flooding can be extremely dangerous due to the speed and volume of the water released which may be with little or no warning. Since this is a prediction of a worst case scenario, it's unlikely that any actual flood would be this large. Reservoir flooding is also extremely unlikely with no loss of life attributed since 1925. The Local Authority for each reservoir listed below could be contacted for further information on local emergency plans.

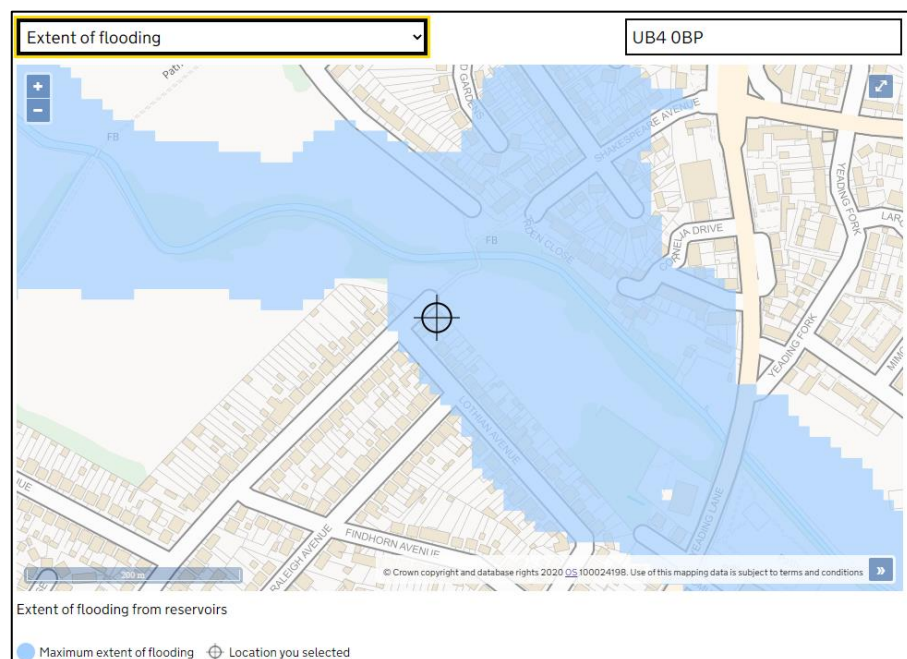


Figure 4-2: Extend of flooding from reservoirs (Source Environment Agency⁴)

⁴ <http://watermaps.environment-agency.gov.uk/wiyby/wiyby.aspx?&topic=ufmfs#x=357683&y=355134&scale=2>
[accessed 28/08/2020]

Table 4-1: Reservoirs identified as posing risk to the site.

Reservoir	Owner	Grid Reference	Lead Local Flood Authority
King George VI	Thames Water Ltd	TQ0417074259	Surrey
Queen Mary	Thames Water Ltd	TQ0831069750	Surrey
Wraysbury	Thames Water Ltd	TQ0303075640	Surrey
Virginia Water	The Crown Estate	SU9785768524	Surrey
Queen Mother	Thames Water Ltd	TQ0129777727	Windsor and Maidenhead

4.6 Residual Flood Risk

- 4.6.1 Residual Risk is defined as ‘the risk which remains after risk avoidance, reduction and mitigation measures have been implemented’. For the purpose of assessing flood risk, it is assumed that events greater than those assessed as Actual Risk are considered a ‘Residual Risk’.
- 4.6.2 As proposed development is located in a medium flood risk zone and does not benefit from the presence of significant defences. As such, the residual risk to the site could be considered to be relatively low.

4.7 Summary of flood risk

- 4.7.1 Table 4.1 below summarises the types of flood risk at the Site:

Table 4-2: Summary of flood risk

Source of risk	Ongoing risk
Fluvial/Tidal Flood Risk	Medium Risk
Flood Risk from Land, Surface Water and Sewers	Low Risk
Groundwater Flood Risk	Low Risk
Flood Risk from Artificial Sources	Low Risk
Residual Flood Risk	Low Risk

5. Flood Risk Management

Principles of Flood Risk Management

- 5.1.1 NPPF requires a precautionary approach to be undertaken when making land use planning decisions regarding flood risk. This is partly due to the considerable uncertainty surrounding flooding mechanisms and how flooding may respond to climate change. It is also due to the potentially devastating consequences of flooding to the people and property affected.
- 5.1.2 Flood risk is a combination of the probability of flooding and the consequences of flooding. Hence 'managing flood risk' involves managing either, the probability of flooding or the consequences of flooding, or both.
- 5.1.3 NPPF requires flooding from tidal, fluvial, land, surface water & sewerage and from groundwater to be considered. The flood risk management measures discussed in this section are based on the sources of flooding identified in Section 4 that are considered to pose a risk to the development proposals.

Sustainable Drainage Systems (SuDS)

- 5.1.4 A sustainable drainage system (SuDS) is recommended to help to reduce the surface water discharge rate based on the proposed development. The requirements for SuDS will ensure that any redevelopment or new development does not negatively contribute to the surface water flood risk off site and instead provides a positive benefit to the level of risk in the area. It will also ensure that appropriate measures are taken to increase the flood resilience of new properties and developments in surface water flood risk areas, such as those identified as being in an area with critical drainage problems.

The SuDS hierarchy and management train has been discussed in the SuDS Manual (C753) which aims to mimic the natural catchment processes as closely as possible. The general hierarchy of the SuDS measures is provided in Table 5-1 below.

Table 5-1 SuDS measures Hierarchy

Measures	Description
Prevention	The use of good site design and housekeeping measures to prevent runoff and pollution (e.g. rainwater harvesting/reuse, Water butt).
Source control	Control of runoff at or very near its source (e.g. soakaways, porous and pervious surfaces, green roofs).
Site control	Management of water in a local area on site (e.g. routing water to large soakaways, infiltration or detention basins)
Regional control	Management of runoff from a site or several sites (e.g. balancing ponds, wetlands).

Table 5-2 below presents the feasibility assessment of the SuDS measures for the site.

Table 5-2 Feasibility Assessment of SuDS measures for the site

SuDS Measures	Description	Feasibility for the site
Prevention	Surface runoff can be improved by implementing rainwater harvesting using water butt	Yes
Source control	Presence of London Clay means the infiltration measures may not be appropriate.	No
Site control	Detention basins are not considered due to the small scale of the propose development.	No
Regional control	Balancing pond/storage will not be feasible due to limited space available.	No

Based on the general assessment of the potential SuDS measures above, installation of a water butt could help to improve the surface runoff from the site.

Flood Resilient Measures

5.1.5 The flood risk management measures discussed in this section are based on the sources of flooding identified in section 4. The following flood resilient measures should be adopted to minimise the damage and to enable quick recovery and clean up after the flooding event:

- Finished floor levels within the proposed rear extension and front porch will be set no lower than existing levels and the concrete floor will be solid. The extension will not be used as sleeping accommodation.
- It is recommended that internal stair access to and from ground floor, are to be maintained for the lifetime of the development, to provide access and egress routes in the event of a breach;
- Non-return valves will be used in the drainage system to prevent back-flow of diluted sewage in situations where there is an identified risk of the foul sewer surcharging.
- Wiring for telephone, TV, Internet and other services will be protected by suitable insulation to minimise damage.
- Wall sockets will be raised to as high as is feasible and practicable to avoid damage if flood waters inundate the property.

Access/Egress

- 5.1.6 Breach flooding can occur rapidly without warning and as such, prior evacuation from the site may not be viable.
- 5.1.7 If flooding has already occurred prior to evacuation, it is advised to remain in the property and await instruction from the emergency services or until it is deemed safe to evacuate. Plans further indicate that internal access will be maintained from the ground floor to the upper floors. Residents should move via internal stairwells to the upper floors of the buildings so as to be located within an area of safe refuge. No evacuation should be sought if flood depths exceed 25cm, evacuation should only be sought with the assistance of the emergency services in these circumstances.
- 5.1.8 As a further precaution, the Environment Agency provides a warning system, which is free to all users, including their flood warning feeds, flood warning widget, live flood warning map and three day flood risk forecast.

Off Site Impacts

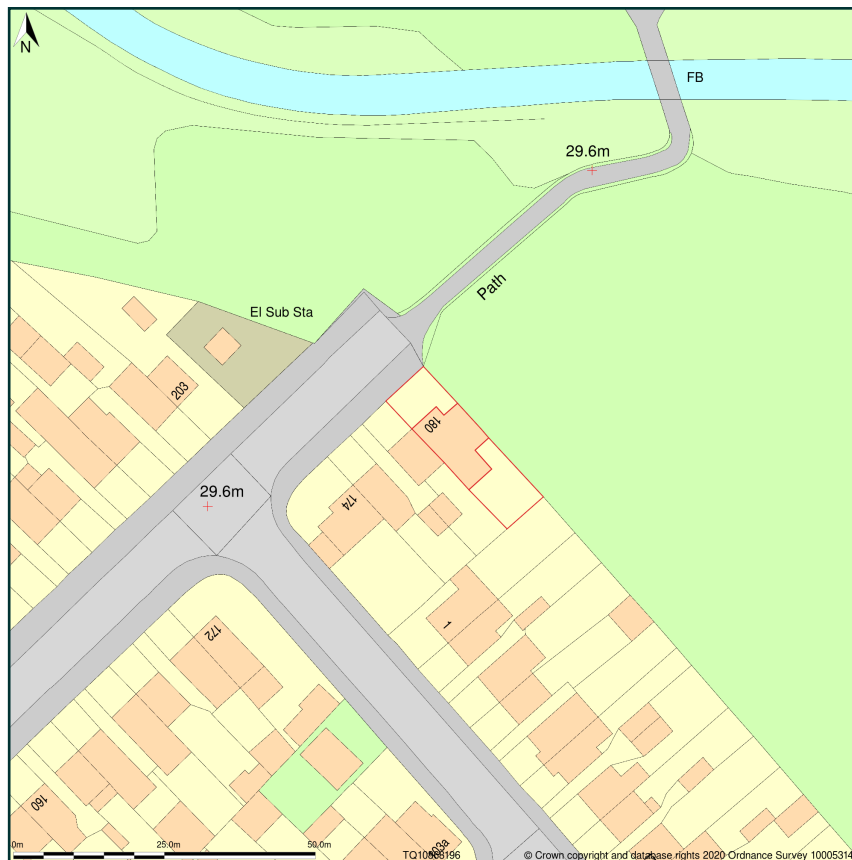
- 5.1.9 The proposed development is for the erection of the single-storey rear extension and front porch at 180 Shakespeare Avenue and there would be no increase in impermeable area.
- 5.1.10 Given the small scale of the development there is limited scope to implement large scale SuDS on site. Furthermore, the small extension is likely to have minimal impact on runoff rates post-development. However, it is recommended that the developer assess the feasibility to implement SuDS (e.g. water butt) as part of the proposed design to limit the runoff generated by the proposed development and consequently, provide betterment to the existing surface water flooding on site.
- 5.1.11 As such, there will likely be negligible change in the surface water runoff rate under post-development conditions.

6. Conclusions & Recommendations

- 6.1.1 An assessment of areas potentially at risk from flooding has been undertaken and the development proposals have been examined in relation to their potential to increase flood risk both on and off site. This desk based FRA accompanies the full planning application for the erection of the single-storey rear extension and front porch at 180 Shakespeare Avenue, to demonstrate that flood risk has been given material consideration throughout the development planning process and development should not be restricted at this Site due to flood risk.
- 6.1.2 The site is located within Flood Zone 2 according to the Environment Agency Flood Zones Maps. The current and proposed development Site use is classified as a 'More Vulnerable' land use according to NPPF. Therefore, the site is compatible with the Environment Agency's vulnerability tests.
- 6.1.3 In line with the NPPF, all sources of flooding have been considered and assessed, using readily available sources of information. It should be noted that at this stage no detailed modelling has been undertaken. The site is located in the area with medium risk from fluvial flooding, and low risk from all other sources including surface water, groundwater, sewer, reservoir and residual risk.
- 6.1.4 The development proposal has considered flood risk at all stages throughout the development of the final layout and reflects the flood risk constraints and the need to manage, and where possible reduce, flood risk in compliance with the guidance in NPPF. The proposal will not increase the risk of flooding to others and as a result, proposed development at this site should not be restricted as a result of flood risk.

Appendix A Existing Site and Proposed Plans

180, Shakespeare Avenue, Hayes, Hillingdon, UB4 0BP



Site Plan shows area bounded by: 510791.41, 181894.38 510932.83, 182035.8 (at a scale of 1:1250), OSGridRef: TQ10868196. The representation of a road, track or path is no evidence of a right of way. The representation of features as lines is no evidence of a property boundary.

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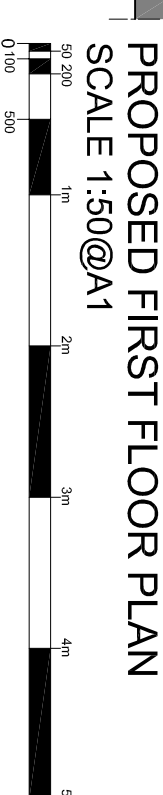
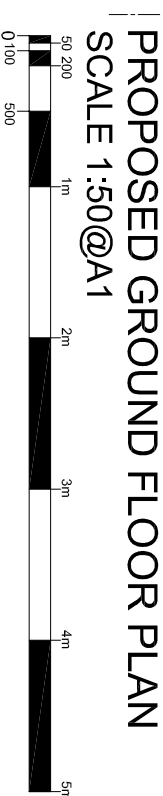
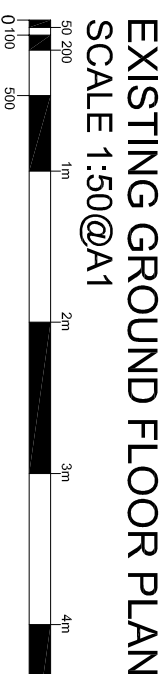
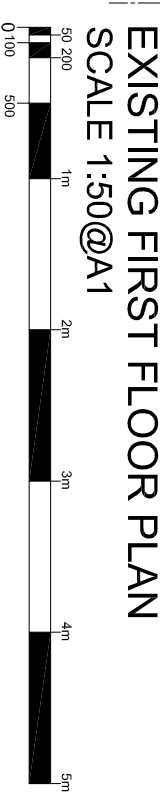
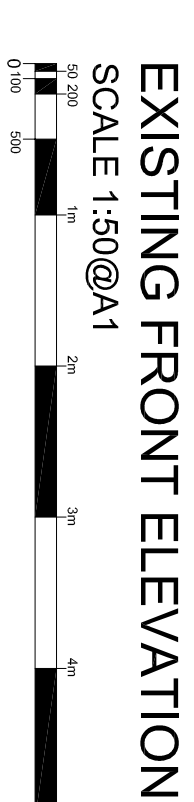
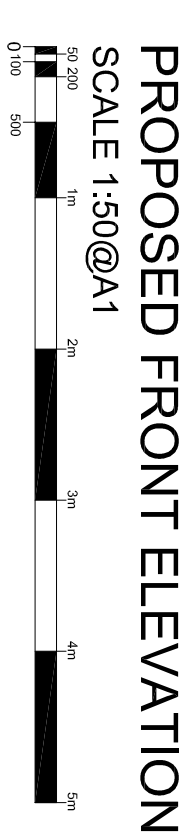
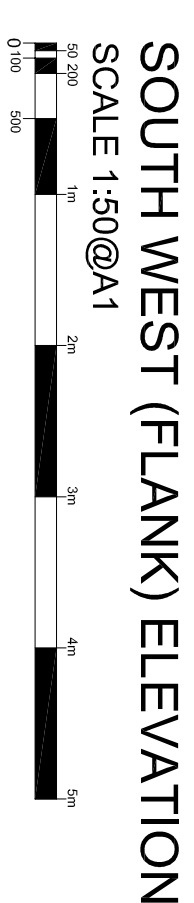
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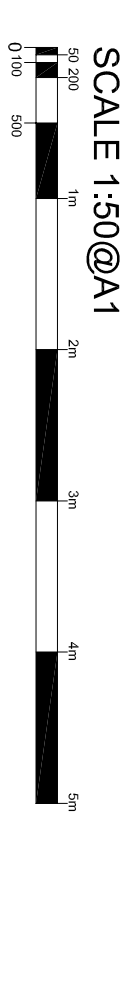
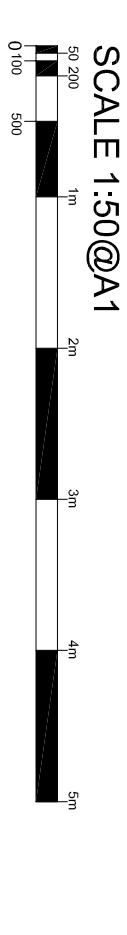
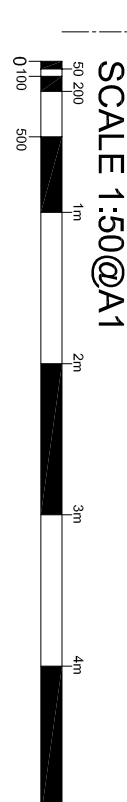
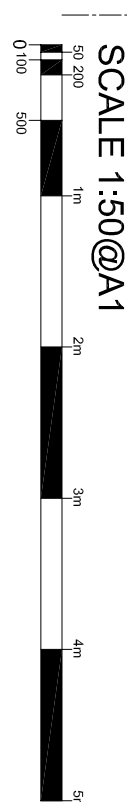
180 Shakespeare Avenue
Hayes UB4 0BP

Drawing: 1R
148/PP/001a

Dots

ARCHITECTURAL SERVICES Itc
••• from survey to planning to construction



[illegible]

8

EXISTING & PROPOSED ELEVATIONS

DATE	MAY 2020	DRAWN	SMTN
SCALE	1:50 @ A1	CHECKED	
STAGE	PLANNING		

DRAWING NO. 148/PP/002a

Appendix B Environment Agency Flood Map for Planning



Flood map for planning

Your reference	Location (easting/northing)	Created
UB4 0BP	510868/181963	29 Aug 2020 9:52

Your selected location is in flood zone 2, an area with a medium probability of flooding.

This means:

- you must complete a flood risk assessment for development in this area
- you should follow the Environment Agency's standing advice for carrying out a flood risk assessment (see www.gov.uk/guidance/flood-risk-assessment-standing-advice)

Notes

The flood map for planning shows river and sea flooding data only. It doesn't include other sources of flooding. It is for use in development planning and flood risk assessments.

This information relates to the selected location and is not specific to any property within it. The map is updated regularly and is correct at the time of printing.

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